**DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCES**

**MSc CYBER SECURITY (III Sem 2022-23)**

**20XC36 – Embedded systems Lab**

**Problem Sheet 1**

1. Create a menu driven program to accept a decimal number as input and convert it into equivalent binary, octal and Hexadecimal
2. Implement the following logical operations using C/C++ language. The inputs and the observed output should be a string of binary digits.

* AND, OR, XOR, NAND

1. Implement the following Shift /Rotate operations using C/C++ language.( Use Functions)

* SHIFT LEFT, SHIFT RIGHT by specified no. of positions.
* Circular Shift (ROTATE) by specified no. of positions.

1. Write a function that prints a negative number in the following formats:

* Signed magnitude data representation
* One’s complement integer data representation
* Two’s complement integer data representation

1. Perform the following arithmetic operations using 2’s Complement notation: Take two 8 bit binary numbers( MSB as sign bit) as input A and B

* (+A) + ( +B),
* (+A) + ( -B)
* (-A) + ( +B)
* (-A) + ( -B )
* (+A) - ( +B)
* (+A) - ( -B)
* (-A) - ( +B)
* (-A)**­** - ( -B )

1. Write a function ***setbits(x,p,n,y***) that returns x with the n bits that begin at position p set to the rightmost n bits of an unsigned char variable y (leaving other bits unchanged).

e.g. if *x* = 10101010 (170 decimal) and *y* = 10100111 (167 decimal) and *n* = 3 and *p* = 6 say then you need to remove off 3 bits of y (111) and put them in x at position 10*xxx*010 to get answer 10111010.

Your answer should print out the result in binary form although input can be in decimal form. Your output should be as follows:

x = 10101010 (binary)

y = 10100111 (binary)

setbits n = 3, p = 6 gives x = 10111010 (binary)

1. Write a program last that prints the last n lines of its text input. By default n should be 5, but your program should allow an optional argument so that

last -n

prints out the last n lines, where n is any integer. Your program should make the best use of available storage. (Input of text could be by reading a file specified from the command or reading a file from standard input)

1. Write a C program to produce a series of floating point random numbers in the ranges (a) 0.0 - 1.0 (b) 0.0 - n where n is any floating point value. The seed should be set so that a unique sequence is guaranteed.